NewScientist.com

Polar observatory reveals first neutrino sky map

23:00 15 July 03
Will Knight

A unique astronomical observatory buried beneath 1500 metres of ice at the South Pole has produced its first survey of high-energy neutrinos.

Researchers hope the data from the Antarctic Muon and Neutrino Detector Array (AMANDA II) will lead to new discoveries related to both cosmic phenomena in the distant Universe and fundamental particle physics.

Neutrinos are one of the most pervasive yet elusive forms of matter in the Universe. Some of the tiny particles are thought to originate from very violent cosmic phenomenon such as tumultuous galactic cores, colliding black holes and perhaps gamma ray bursts. But as neutrinos pass through planets and stars virtually unhindered, they are extremely hard to detect.

"This is the first data with a neutrino telescope with realistic discovery potential," says Francis Halzen, of the University of Wisconsin-Madison, who is one of the researchers behind the project. "This is the most sensitive way ever to look at the high-energy neutrino sky."

Amanda II could enable astronomers to make the first links between incoming neutrinos and astronomical objects such as active galactic nuclei. "If you saw a point source of neutrinos it would be one of the most exciting discoveries in astroparticle physics," says Alan Watson, at Leeds University in the UK. "It would tell you that you had a source that was accelerating protons to very high energies."

Icy column

The Amanda II observatory acts like a giant telescope, but pointing down towards the centre of the Earth. This allows most particles to be screened out by our planet, leaving the telescope to focus only on incoming neutrinos.

The observatory consists of 677 glass detectors strung along 19 fibre optic cables, each of which extends for hundreds of metres. The detectors are arranged around a column of Antarctic ice measuring 500 metres high and 200 metres across.

These detectors are sensitive to Chenkov light, which is the end product of collisions between a neutrino and another particle, such as a proton or neutron in the ice. Such collisions produce muons, which then create a faint trace of light in the same direction that the neutrino was travelling.

The data produced by AMANDA II during its first year of operation will be revealed at the International Astronomical Union in Sydney, Australia, on Tuesday.

23:00 15 July 03

Return to news story